REMARKS

Claims 1-23 were pending. By this Amendment, claims 1 and 11 have been amended to clarify the claimed subject matter, and new claims 24 and 25 have been added. Claims 1-25 would be pending upon entry of this Amendment, with claims 1 and 11 being in independent form.

The drawings were objected to as having informalities, and more specifically, that labels 1503 and 1803 in Figs. 15 and 18, respectively, are not referenced in the specification.

The specification has been amended to include references to labels 1503 and 1803.

Withdrawal of the objection to the drawings is respectfully requested.

Claims 1-4, 6, 9-14, 16, 19 and 20 were rejected under 35 U.S.C. § 103(a) as purportedly unpatentable over Sabol et al. (US 2004/0101086 A1) in view of Kim et al. (US 6,278,761), and further in view of Kvist et al., "Total and visceral adipose-tissue volumes derived from measurements with computed tomography in adult men and women: predictive equations" (1988). Claims 5 and 15 were rejected under 35 U.S.C. § 103(a) as purportedly unpatentable over Sabol in view of Kim and Kvist and further in view of Grauer et al., "Quantification of Body fat Distribution in the Abdomen using Computer Tomography" (1984). Claim 7, 8, 17 and 18 were rejected under 35 U.S.C. § 103(a) as purportedly unpatentable over Sabol in view of Kim and Kvist and further in view of Wollenweber (US 7,155,047). Claims 21 and 22 were rejected under 35 U.S.C. § 103(a) as purportedly unpatentable over Sabol in view of Kim and Kvist and further in view of Rosania et al. (US 2003/0059093 A1). Claims 23 was rejected under 35 U.S.C. § 103(a) as purportedly unpatentable over Sabol in view of Kim, Kvist and Wollenweber and further in view of Griffin et al. (US 2004/0207625 A1).

Applicant respectfully submits that the present application is allowable over the cited art,

for at least the reason that the cited art does not disclose or suggest the aspects of the present application of ***setting a line surrounding the non-adipose region automatically***.

Sabol, as understood by applicant, proposes an approach for quantifying tissue fat content using a multi-energy computed tomography (MECT) system, wherein, in some instances, the MECT image data is segmented to determine a region (such as an organ) of interest. The region of interest may include, amongst other things, lean tissue.

Sabol, [0046]-[0047] (reproduced below), states as follows:

> [0046] In use, method 90 includes acquiring 92 MECT anatomical image data for tissue 74, and segmenting 94 the MECT image data to determine a region of interest, for example an organ of interest such as a liver. Once the region of interest is segmented 94 from the surrounding region of tissue, such as tissue 74, a tissue characterization is determined for the region of interest. More specifically, the segmented image data is decomposed 96 to obtain ***a density image representing a content of fatty tissue within the region of interest and a density image representing a content of lean tissue within the region of interest***. The image representing fatty tissue content is then merged 98 with the image representing lean tissue content to obtain a density image that quantifies on a pixel by pixel basis a fat/lean ratio for every point within the region of interest. In one embodiment, the anatomical image is displayed conventionally (gray-scale corresponding to CT numbers) while the fat/lean density image may then be superimposed 100 on the anatomical image to obtain a combined image for the region of interest. More specifically, the fatty tissue image and the lean tissue image are registered with each other and the pixel values of the fatty tissue image are divided by the pixel values of the lean tissue image on a pixel by pixel basis.
>
> [0047] FIG. 7 is a schematic illustration of a method 110 for quantifying fat content in tissue 74 (shown in FIG. 5) using MECT system 10 (shown in FIGS. 1 and 2). Method 110 ***utilizes segmentation of an image field to determine a region-of-interest for tissue characterization***. Decomposed images are segmented using the above described CT image segmentation techniques. In one embodiment, segmentation of a region of interest is performed manually. Manual segmentation of a region of interest includes displaying image data to a user, wherein the user delineates the region using a mouse or any other suitable interface, such as, for example, a touch screen, eye-tracking, and/or voice commands. In an alternative embodiment, segmentation of a region of interest is performed automatically. ***Automated segmentation of a region of interest includes using an algorithm that automatically delineates an area of interest using prior knowledge, such as the shape and size of a mass***. In yet another embodiment, segmentation of a region of interest is performed using a combination of manual and automatic segmentation.

Thus, Sabol proposes that segmentation of an area of interest may be performed automatically using prior knowledge, such as of the shape and size of the area of interest, and after such segmentation of the region of interest, the segmented image data can be decomposed to obtain a density image representing a content of fatty tissue within the region of interest and a density image representing a content of lean tissue within the region of interest. The image representing fatty tissue content is then merged with the image representing lean tissue content to obtain a density image that quantifies on a pixel by pixel basis a fat/lean ratio for every point within tissue. Stated another way, what is delineated by the segmentation in Sabol is the region of interest which can include both fatty tissue as well as lean tissue.

As shown in Fig. 8 (reproduced below) of Sabol, the region 86 of interest representing a liver is segmented from the remainder of the imaged anatomy, and portions of different fat/lean ratio are shown with different grayscale values.

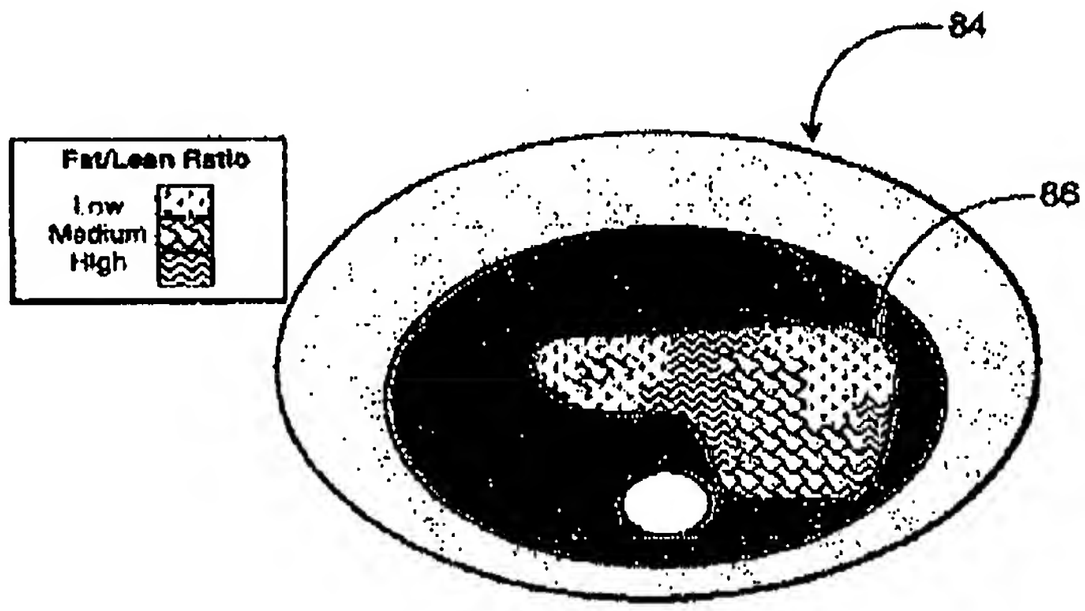


FIGURE 8

As can be seen in Fig. 8 of Sabol, the region 86 of interest includes both fatty content as well as lean content, and one can visually detect fatty content by the distinct grayscale appearance. However, Sabol does NOT disclose or suggest ***setting a line surrounding the non-adipose region automatically***.

As pointed out above, Sabol proposes segmenting the region (or organ) of interest as a whole, and NOT the non-adipose region within the region of interest.

Kim, as understood by applicant, proposes an approach for establishing a range of somatic fat by Gaussian function approximation in computerized tomography, by obtaining a histogram of Hounsfield values in a computerized tomography image, approximating the histogram to Gaussian function by least square method and determining the range of somatic fat from a width and a position of a somatic fat peak in the histogram of Hounsfield values.

As previously discussed of record, in the approach proposed in Kim, an abdominal cavity portion and the subcutaneous portion are separated in the computerized tomography image (composed of Hounsfield values) to separately measure the amounts of intra-abdominal cavity fat and subcutaneous fat. An image of high contrast is obtained by narrowing the range of Hounsfield values to separate the abdominal cavity and the subcutaneous portion. The pixels in such image having Hounsfield values in a specific subrange of the narrowed range are painted with same color, and thus the subcutaneous fat portion is combined into one lump. The subcutaneous fat portion is separated into a portion composed of same values so as to separate the abdominal cavity and the subcutaneous portion.

The intra-abdominal cavity fat and subcutaneous fat in Kim are equated in the Office Action to a visceral adipose region and a subcutaneous adipose region.

However, Kim does NOT involve the above-mentioned aspect of the present application of ***setting a line surrounding the non-adipose region automatically***.

Kvist, as understood by applicant, reports a study of techniques for quantitative determination of total and visceral adipose-tissue (AT) volume. In the experiments reported in Kvist, the visceral adipose-tissue area was specified by the operator by using a light pen to

encircle the abdominal and thoracic cavities of the trunk.

While the visceral AT area is determined in Kvist based on particular regions encircled by operation of a light pen, Kvist, like the other cited references, does NOT disclose or suggest the above-mentioned aspect of the present application of setting a line surrounding the non-adipose region ***automatically***.

Such aspect of the present application reduces the trouble to the operator of accurately and specifically specifying the non-adipose region.

Applicant submits that the cited art, even when considered along with common sense and common knowledge to one skilled in the art, does ***NOT*** render unpatentable the above-mentioned aspect of the present application.

Accordingly, applicant respectfully submits that independent claims 1 and 11, and the claims depending therefrom, are allowable over the cited art.

Regarding claims 4 and 14 of the present application, it should be noted that when a non-adipose region is extracted from the body region, the abdominal wall layer does not continuously surround the viscus but rather gaps are present in several spots. For such abdominal wall layer with the gaps, the outline of the abdominal wall muscle layer including the whole viscus cannot be extracted simply by tracing the peripheral edge. Thus, in claims 4 and 14, spaces between the attention points (for example, set in S702 in Fig. 7 of the application) are interpolated by higher order spline interpolation to interpolate the gaps in the abdominal wall muscle layer and extract an outline of the visceral region as shown in FIG 8(b) of this application.

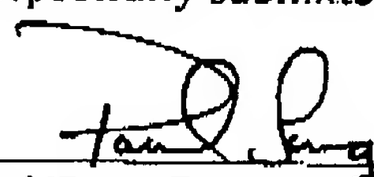
The cited art also fails to disclose or suggest such aspects of the present application.

In view of the remarks hereinabove, applicant submits that the application is now allowable, and earnestly solicits the allowance of the application.

If a petition for an extension of time is required to make this response timely, this paper should be considered to be such a petition. The Patent Office is hereby authorized to charge any required fees in connection with this amendment, and to credit any overpayment, to our Deposit Account No. 03-3125.

If a telephone interview could advance the prosecution of this application, the Examiner is respectfully requested to call the undersigned attorney.

Respectfully submitted,



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